

***Schoenus coultasii* (Cyperaceae: Schoeneae), a new annual species known from a single site in the Pilbara region of Western Australia**

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SHORT COMMUNICATION

Schoenus L. is a large, cosmopolitan genus concentrated in the southern hemisphere, with more than 90 species in Australia (Wilson 1993). It comprises species that are either clearly perennial (the majority) or clearly annual, with a few others that are ambiguous in this regard but are possibly short-lived perennials. Under the modified sectional classification adopted by Musili *et al.* (2016: 267), the annual species are placed in sect. *Helothrix* (Nees) Kük.; however, they do not form a monophyletic group in the phylogenetic trees published in the same paper (Musili *et al.* 2016: 271, 272), apparently indicating that a change to the current infrageneric classification will be necessary.

The discovery of *Schoenus coultasii* Hislop *sp. nov.* on a mining tenement in Western Australia's Pilbara bioregion in 2014 is a significant find. It is the only annual species of *Schoenus* to have been collected in the Pilbara, the large perennials *S. falcatus* R.Br. and *S. punctatus* R.Br. being the only other species recorded for this region. Furthermore, it remains known from just one collection, suggesting that it may have a localised distribution.

Its formal recognition below adds to the recent description of *S. thedae* M.D.Barrett & R.L.Barrett (Barrett & Barrett 2015), the only annual species known to occur in the Kimberley, and brings the number of published annual *Schoenus* species recognised in Western Australia to 16, with a further five phrase-named taxa awaiting formal taxonomic assessment (Rye 1997a, 1997b; Western Australian Herbarium 1998–).

Schoenus coultasii* Hislop, *sp. nov.

Type: south-west of Marble Bar, Western Australia [precise locality withheld for conservation reasons], 9 May 2014, D. Coultas & S. Coultas DCSC–Opp 07 (*holo:* PERTH 08715718).

Schoenus sp. Marble Bar (D. Coultas & S. Coultas DCSC–Opp 07), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 2 December 2019].

Annual caespitose herb, *c.* 100–160 mm high. *Leaves* sheathing, the basal sheaths open, the distal ones closed; sheath 6–10 mm long, mostly pale yellow-green or straw-coloured, often with red tinges

towards the base and becoming hyaline towards the margins; ligule a membranous flap of tissue, 0.2–0.3 mm long; blade 30–60 mm long, 0.5–0.8 mm wide, channelled adaxially, with a prominent mid-vein on the abaxial surface, glabrous apart from the antrorsely scabrous distal margins. *Culms* 0.3–0.5 mm diam., glabrous, distinctly ribbed. *Bracts* erect, sheathing; sheaths 1–4 mm long, closed, coloration as for leaf sheaths; blade 5–25 mm long, glabrous apart from antrorsely scabrous distal margins. *Inflorescence* 20–50 mm long, with 3–6 pedunculate spikelets per culm, in 2 or 3 clusters, each subtended by a bract; peduncles angular, antrorsely scabrous on the angles, 2–8 mm long. *Spikelets* compressed, narrowly ovoid, 5–8 mm long, 1.6–2.2 mm wide, 2–5-flowered, with 2 or 3 empty basal glumes; the rachis flattened, strongly flexuose, with hyaline wings subtending the nuts. *Floral glumes* narrowly ovate in outline, keeled, 3.8–4.5 mm long, the keel green, antrorsely scabrous, the lateral surfaces straw-coloured, often with some irregular streaks of brown or red, becoming hyaline towards the margin, sometimes ± hyaline throughout. *Perianth segments* well-developed, in 2 whorls of 3, much longer than the nut, the distal portion very fine, awn-like, antrorsely scabrous, the basal portion distinctly broader and antrorsely hairy, shed with the nut; outer whorl 1.5–2.1 mm long; inner whorl 2.3–2.8 mm long. *Stamens* 3; anthers 2.2–2.3 mm long, apiculate. *Style* with 3 stigmatic branches, the undivided portion 2.0–2.2 mm long, the branches 1.5–1.8 mm long. *Nut* shortly stipitate (stipe c. 0.2 mm long), trigonous-obovoid, distinctly beaked, 1.0–1.3 mm long (including the beak but not the stipe), 0.6–0.8 mm wide, 3-ridged, the ridges produced into prominent horns apically and separated by 5–8 longitudinal rows of strongly defined cells; beak 0.2–0.4 mm long. (Figure 1)

Diagnostic characters. Distinguished from other annual species of *Schoenus* by the following character combination: spikelets compressed, narrowly ovoid, 5–8 mm long, 1.6–2.2 mm wide; lateral surfaces of the glumes with pale coloration (straw-coloured, often with some darker red or brown streaks, with broad hyaline margins or sometimes more or less hyaline throughout); perianth segments in 2 whorls, the inner (2.3–2.8 mm long) distinctly longer than the outer (1.5–2.1 mm long); perianth segments consisting of a distal portion that is very fine and antrorsely scabrous and a markedly different basal portion that is significantly broader and antrorsely hairy; nut distinctly beaked (the beak 0.2–0.4 mm long), 3-ridged, the ridges produced into prominent horns apically and separated by 5–8 rows of strongly defined cells.

Distribution and habitat. Currently known only from one locality in the Marble Bar area of the east Pilbara in Western Australia. This population occurs on shallow, sandy loam over granite, growing with other annual herbs and grasses.

Phenology. The type specimen has both flowers and mature fruit present and was collected in May. According to rainfall records for Marble Bar, the four wettest months are between December and March. Fertile plants could therefore be reasonably expected during the period April to June.

Etymology. The epithet honours David (Dave) Coultas (1984–), a fine botanist and ecologist currently working for Woodman Environmental Consulting. During his career, he has been involved in the discovery of many new plant species and has always made it a priority to facilitate their formal recognition by actively liaising with staff at the Western Australian Herbarium. Along with his brother Sam, Dave was the discoverer, and to date they are the only collectors, of the species described here.

Vernacular name. Pilbara Annual Bog-rush.

Conservation status. This species is currently listed by Smith and Jones (2018) as Priority One under Conservation Codes for Western Australian Flora, under the name *S. sp.* Marble Bar (D. Coultas & S. Coultas DCSC–Opp 07).

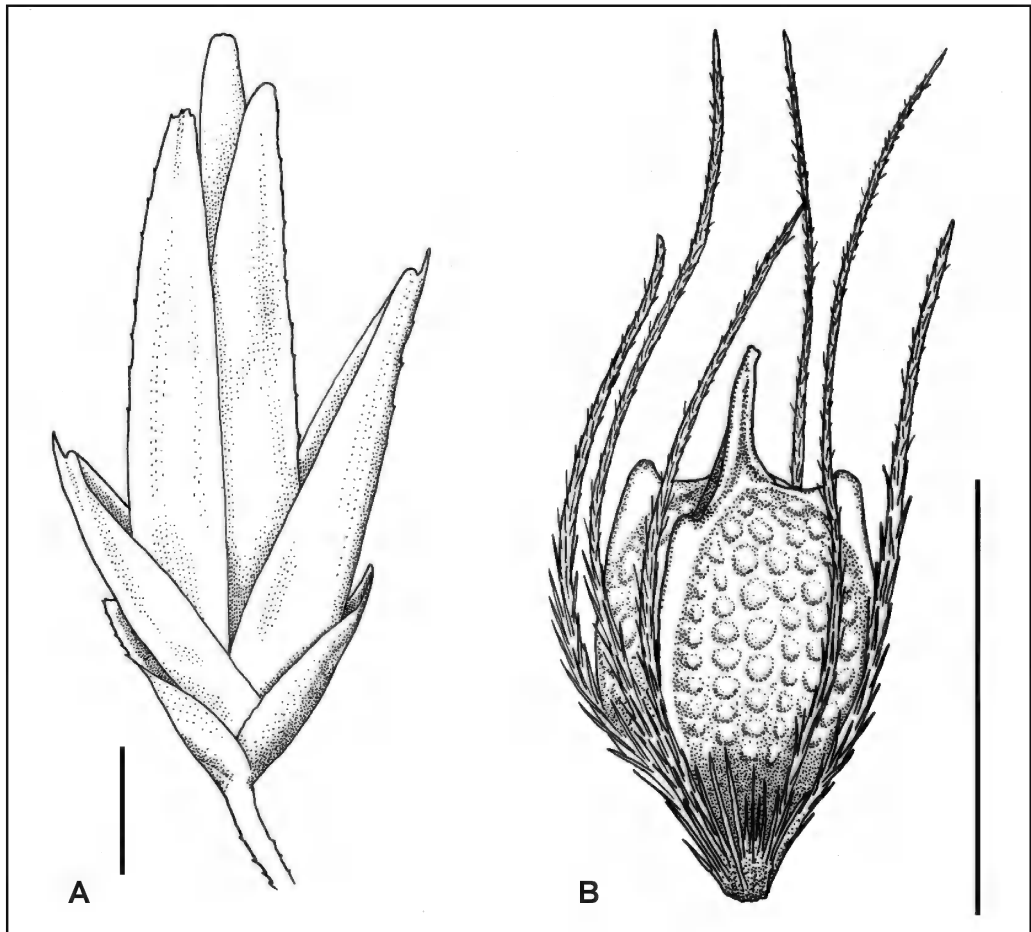


Figure 1. *Schoenus coultasii*. A – spikelet; B – nut and perianth segments. Scale bars = 1 mm. Drawn by Skye Coffey from D. Coultas & S. Coultas DCSC–Opp 07.

Affinities. The sharing of two significant morphological features suggests that the relationships of *S. coultasii* may lie with *S. badius* Rye or *S. thedae*. All three species have a distinctive type of perianth segment consisting of two clearly differentiated portions: a very fine, antrorsely scabrous distal portion and a much broader and hairy basal portion. There is also a similarity in their nut morphology with all having the three ridges produced into lobes or horns.

Schoenus coultasii can be distinguished from *S. badius* by its paler glumes (lateral surfaces straw-coloured, often with some darker red or brown streaks, with broad hyaline margins or sometimes more or less hyaline throughout *cf.* lateral surfaces uniformly chestnut-brown to dark brown with narrow hyaline margins in *S. badius*) and longer perianth segments (the longer, inner ones 2.3–2.8 mm long *cf.* 1.2–1.5 mm long). In addition, the three nut ridges are produced into distinct horns in *S. coultasii* (*cf.* merely slightly raised lobes in *S. badius*) and the nut beak is longer (0.2–0.4 mm long *cf.* 0.1–0.2 mm in *S. badius*). There is also a difference in the shape of the cells on the surface of the nut: in *S. coultasii* these are about as high as they are wide (Figure 1B) but in *S. badius* they are distinctly wider than high (Figure 2B).

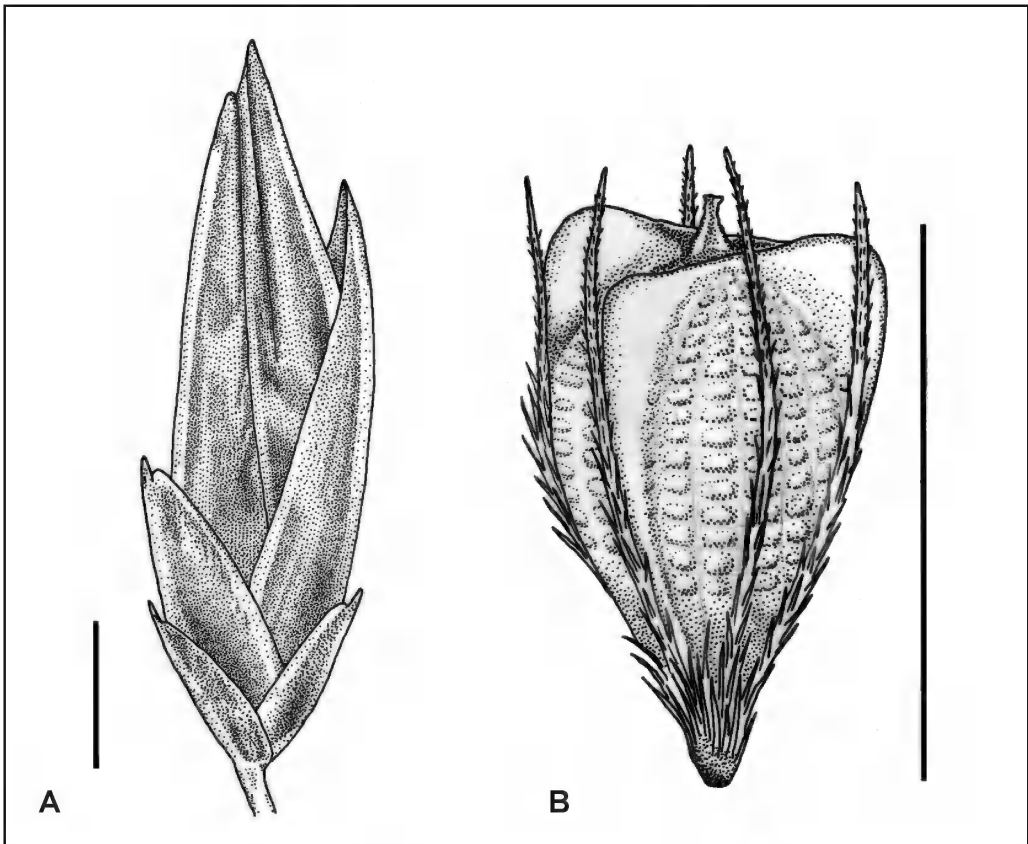


Figure 2. *Schoenus badius*. A – spikelet; B – nut and perianth segments. Scale bars = 1 mm. Drawn by Skye Coffey from B. Taylor & L. McFarlane WE 024-16.

From *S. thedae*, *S. coultasii* differs most obviously in its shorter spikelets (5–8 mm long *cf.* (5.5–)7–15 mm) and in the number and prominence of the cells between the nut ridges. Whereas in *S. coultasii* there are five to eight rows of strongly defined cells between the ridges, in *S. thedae* there are about ten and these are very obscure.

The known distributions of the three species are massively disjunct: the most northerly collection of *S. badius* is about 925 km to the south-west of *S. coultasii* while the only known location for *S. thedae* is about 1,020 km to the north-east.

Schoenus pennisetis S. T. Blake from the South West Botanical Province has a similar perianth segment morphology to *S. coultasii* (i.e. consisting of 2, well-differentiated portions) but the nut cells are more numerous (at least 10 rows between the ridges) and very obscure, and the ridges taper inwards towards the beak (i.e. they are not produced into lobes or horns).

Identification. In order to accommodate *S. coultasii* and *S. thedae*, the only Western Australian annual species published since Rye's (1997b) conspectus, her key to species requires modification from couplet 14 as follows:

14. Nut with fine reticulate pattern of many (10 or more) rows of cells or papillae on each surface, or sometimes appearing smooth
15. Semi-aquatic plants with leaves much more slender and lax than the stems. Spikelets solitary or rarely 2 per culm, 2.5–3.5 mm long **S. sp. Beaufort**
- 15: Terrestrial plants with leaves similar in width to the stems. Spikelets several per culm, 4–15 mm long
16. Spikelets (5.5–)7–15 mm long. Perianth segments greatly exceeding the nut. Nut ridges produced into apical horns **S. thedae**
- 16: Spikelets 4–6 mm long. Perianth segments as long as, or shortly exceeding the nut. Nut ridges tapering inwards distally towards the base of the beak, not produced into horns **S. pennisetis**
- 14: Nut with more strongly defined reticulate pattern, with 3–8 rows of cells on each surface
17. Nut with 3–5 rows of cells on each surface, the cells of the central row(s) large, usually much larger than the rest
18. Spikelets borne at 2–many levels up each stem, with often only one spikelet at each level. Floral glumes (3.5–)4–5.5 mm long **S. plumosus**
- 18: Spikelets all borne in a terminal cluster on each stem. Floral glumes 1.5–3 mm long **S. nanus**
- 17: Nut with 5–8 rows of medium-sized cells on each surface
19. Perianth segments consisting of 2 clearly differentiated portions, a very fine, antrorsely scabrous distal portion and a much broader, and hairy basal portion. Nut ridges produced into apical lobes or horns
20. Lateral surfaces of glumes pale, straw-coloured, often with some darker red or brown streaks, with broad hyaline margins or sometimes ± hyaline throughout. Perianth segments 1.5–2.8 mm long. Nut ridges produced into distinct apical horns. Nut beak 0.2–0.4 mm long **S. coultasii**
- 20: Lateral surfaces of glumes uniformly chestnut-brown to dark brown, with narrow hyaline margins. Perianth segments 1.2–1.5 mm long. Nut ridges produced into slightly raised lobes. Nut beak to 0.1–0.2 mm long **S. badius**
- 19: Perianth segments uniform throughout their length, either hair-like or plumose. Nut ridges tapering distally towards the base of the beak, not produced into lobes or horns
21. Perianth segments hair-like **S. elegans**
- 21: Perianth segments plumose
22. Floral glumes 6–7 mm long. Anthers c. 3 mm long. Nut shed with the perianth segments attached **S. sp. Bullsbrook**
- 22: Floral glumes 2.5–5 mm long. Anthers usually 0.4–1 mm long. Nut shed leaving perianth attached to the plant **S. humilis**

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